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November 12, 2004

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APPLICATION NUMBER: *60/516,728*
FILING DATE: *November 04, 2003*

By Authority of the
COMMISSIONER OF PATENTS AND TRADEMARKS

T. Lawrence

T. LAWRENCE
Certifying Officer

PTO/SB/16 (08-03)
Approved for use through 07/31/2006. OMB 0651-0032
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19587 U.S.PTO 60/516728 110403

PROVISIONAL APPLICATION FOR PATENT COVER SHEET

This is a request for filing a PROVISIONAL APPLICATION FOR PATENT under 37 CFR 1.53(c).

Express Mail Label No.

INVENTOR(S)

Given Name (first and middle [if any])	Family Name or Surname	Residence (City and either State or Foreign Country)
Jack Gregory R.W.	Brass McEwan	North York, Canada Warkworth, Canada

Additional inventors are being named on the _____ *separately numbered sheets attached hereto*

TITLE OF THE INVENTION (500 characters max)

INJECTION HOSE ASSEMBLY WITH SWIVEL

Direct all correspondence to: **CORRESPONDENCE ADDRESS**

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ENCLOSED APPLICATION PARTS *(check all that apply)*

☑ Specification *Number of Pages* 10
☐ CD(s), Number _____
☑ Drawing(s) *Number of Sheets* 8
☐ Other (specify) _____
☑ Application Date Sheet. See 37 CFR 1.76

METHOD OF PAYMENT OF FILING FEES FOR THIS PROVISIONAL APPLICATION FOR PATENT

☑ Applicant claims small entity status. See 37 CFR 1.27.
☐ A check or money order is enclosed to cover the filing fees.
☑ The Director is herby authorized to charge filing fees or credit any overpayment to Deposit Account Number: 50-1710
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The PTO did not receive the following listed item(s) 2 Pgs. of Data sheet 1 of 4 and 2 of 4

Respectfully submitted,

SIGNATURE Dawn C. Hayes

TYPED or PRINTED NAME Dawn C. Hayes

Date 11/4/2003

REGISTRATION NO. 44,751 *(if appropriate)*

Docket Number: 213899.00016

TELEPHONE (202)625-3500

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PROVISIONAL APPLICATION COVER SHEET
Additional Pag

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Docket Number

INVENTOR(S)/APPLICANT(S)		
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Number 2 of 4

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Injection Hose Assembly With Swivel

FIELD OF THE INVENTION

The invention relates to injection hoses that are utilized to inject liquid dyes, lubricant or additives or other liquids into an air conditioning or refrigeration system.

BACKGROUND OF THE INVENTION

Air conditioning and refrigeration systems often leak refrigerant and lubricant. This leakage can reduce the efficiency of the system. A substantial loss of refrigerant and lubricant can also cause premature failure including compressor burnout. Also, refrigerants escaping into the environment, are known to cause ozone depletion and, possibly, to global warming. Leak detection is generally performed by injecting a fluorescent dye into the air conditioning or refrigeration system.

A number of injectors have been developed for injecting dye into an air conditioning or refrigeration system. Some injectors may also be used to inject other liquids into a system such as refrigerant lubricant and performance additives. As an example, U.S. Pat.No. 6,263,778 issued June 24, 2001 to Brass describes a liquid injection device.

Typically, injectors require a hose or conduit to convey the liquid from the injector reservoir or cartridge to the air conditioning or refrigeration system. For example, referring to Figs. 1 to 4, a hose assembly for R134a systems has a 90 degree R134a female quick disconnect fitting 1 that is usually connected to a low side service port of the air conditioning system. These fittings 1 typically have an automatic shutoff when removed from the air conditioning system after the injection process is completed. Hose 2 is used to convey the liquid. Interface fitting 3 is used to connect the hose assembly to an injector reservoir or cartridge. Fitting 3 may be a screw on or quick disconnect type interface and may also include a check valve embodiment to prevent back pressure from the air conditioning system. The check valve will also prevent liquid from exiting the hose when removed from the injector.

Referring to Figure 2,an R12/R22 embodiment similar to the hose assembly of Fig. 1 may be made by replacing fitting 1 with an R12/R22 fitting 4. It is to be recognized that fittings compatible with R12 and R22 refrigerant systems will also be compatible with many other types of refrigerant systems that use similar fittings. Hose assemblies for other types of systems that are not compatible with R134A or R12/R22 fittings can be easily made by replacing the fitting 1 or 4 with a compatible fitting.

Referring to Fig. 3 an adaptor fitting may be used to convert an R134a hose assembly as in Fig. 1 into an R12 or R22 hose assembly. In this embodiment a male quick disconnect 5 is fitted into fitting 1 of Fig. 1 in order to perform the conversion.

Referring to Fig. 4 there are many different injectors that can be combined with the type of hose described above, an example of injector 6 has a spindle which, when turned in a clockwise direction through injector body 7, pushes a piston in a cartridge 8 in a forward direction. Pushing the piston forward, forces the liquid in the cartridge 8 to open a check valve 9 further conveying the liquid through flexible hose 10 and further past R134a female fitting 12 into an air conditioning or refrigeration system. Total length 11 of an injection system can be up to 22 inches or more.

SUMMARY OF THE INVENTION

In a first aspect the invention provides an injection hose assembly for connection between a pressurized system and an injector for injecting fluids into the pressurized system. The assembly has a first fitting compatible with a fitting on the pressurized system, and a second fitting compatible with the injector. The second fitting has an opening to which the injector can be connected. The assembly also has a substantially non-collapsing joint between the first fitting and the second fitting, and a generally tubular hose between the first fitting and the swivel.

The first fitting, hose, swivel and second fitting are connected to provide fluid connection between the first fitting and the second fitting. The second fitting is offset from the hose and the joint permits at least two positions of the second fitting with respect to the hose. In the first position the second fitting opening is substantially aligned with the hose directed towards the first fitting. In the second position the second fitting opening is directed at 90 degrees to the hose.

The joint may have a third position again substantially at 90 degrees to the first position, while the second fitting opening is directed in the opposite direction from the second position.

In a second aspect the invention also provides an injection hose assembly for connection between a pressurized system and an injector for injecting fluids into the pressurized system. The assembly has a first fitting compatible with a fitting on the pressurized system, and a second fitting compatible with the injector. The second fitting has an opening to which the injector can be connected. The assembly also has a substantially non-collapsible swivel joint between the first fitting and the second fitting, and

a generally tubular hose between the first fitting and the swivel. The first fitting, hose, swivel and second fitting are connected to provide fluid connection between the first fitting and the

second fitting. The second fitting is offset from the hose and the joint permits rotation of the second fitting with respect to the hose between a first and a second position. In the first position the second fitting opening is substantially aligned with the hose directed towards the first fitting. In the second position the second fitting opening is directed at 90 degrees to the hose.

The joint may also permit rotation of the second fitting to a third position again substantially at 90 degrees to the first position, while the second fitting opening is directed in the opposite direction from the second position.

In either aspect the second fitting may be offset from the hose by a distance sufficient to permit the hose and the injector to pass one another without bending the hose.

Other aspects of the invention will be evident from the figures and other description provided herein.

BRIEF DESCRIPTION OF THE DRAWINGS

For a better understanding of the present invention and to show more were clearly how it may be carried into effect, reference will now be made, by way of example, to the accompanying drawings which show the preferred embodiment of the present invention and in which:

FIG. 1 is a perspective view of a hose assembly for use with an R134A refrigeration system,

FIG. 2 is a perspective view of a hose assembly for use with an R12/R22 refrigeration system,

FIG. 3 is a perspective view of an adapter for converting the hose assembly of Fig. 1 for use with an R12/R22 refrigeration system,

FIG. 4 is a perspective view of a hose assembly of Fig. 1 used in association with a cartridge and manual injector,

FIG. 5 is a disassembled perspective view of a hose assembly with swivel in accordance with the preferred embodiment of the invention and a cartridge for holding liquid to be injected,

FIG. 6 is an assembled perspective view of the hose assembly and cartridge of Fig. 5 and a manual liquid injector, with the hose in a first position,

FIG. 7 is a perspective view of the hose assembly, cartridge and injector of Fig. 6, with the hose in a second position,

FIG. 8 is a perspective view of the hose assembly, cartridge and injector of FIG. 7, with the hose in a third position,

FIG. 9A is an exploded view of a preferred embodiment of a swivel for use in the hose assembly of Figs. 5 through 8,

FIG. 9B is a partially exploded view of the swivel of FIG. 9A from a position 90 degrees about the axis of the swivel,

FIG. 9C is an end view of a plug used in the swivel of Figs. 9A & 9B,

FIG. 9D is an end view of a portion of the swivel of Figs. 9A and 9B,

FIG. 10 is a perspective view of a straight R134A hose subassembly of the hose assembly of Figs. 5 through 8 for use with the swivel of Figs. 9A & 9B,

FIG. 11 is a perspective view of a 90 degree R134A hose subassembly of the hose assembly of Figs. 5 through 8 for use with the swivel of Figs. 9A & 9B, and

FIG. 12 is a perspective view of an R12/R22 hose subassembly of the hose assembly of Figs. 5 through 8 for use with the swivel of Figs. 9A & 9B.

DETAILED DESCRIPTION OF THE PREFERRED EMBODIMENT

Referring to Figs. 5 through 12, a hose assembly provides a more versatile method of using an injection system (an injector together with a hose assembly) in that it allows for easier access to connect to an air conditioning or refrigeration system as well as being more compact to store in a carrying case or tool box. Today's automotive engine compartments leave very little access space for repairs. Attaching an injector hose assembly to the low side service port of an air conditioning system can be cumbersome and inconvenient. After the connection is made the position of the injector body may not be conducive to being comfortable and to perform accurately the injection process. The swivel feature provides a sound ergonomic solution to this process. Additionally a feature of being able to fold the hose assembly to being parallel (aligned side by side) with the injector body allows for easer storage in a tool box or drawer.

Referring to Fig. 5, cartridge 13 (in this case an empty cartridge 13) similar to that in Fig. 4 has a piston 14. Male threads 15 provide a connector 15. A hose assembly has a joint (swivel body 16 and swivel arm 18). Swivel body 16 has a threaded opening 16a that mates with connector 15. The swivel body 16 with opening 16B provides a fitting for connection to an injector (in this case the cartridge is part of an injector). The swivel body is connected to swivel arm 18 to provide a swivel point 17. Flexible hose 19 connects the swivel arm 18 to a fitting 19B for connection to an air conditioning or refrigeration system. The swivel arm 18 provides an offset between the hose 19 and the injector to allow the injector and hose to pass one another without having to bend the hose.

The connection to the air conditioning system is preferably made at the high side of the system; however, some air conditioning systems only provide a high side port. As is known to those skilled in the art, the hose assembly should be designed to withstand pressures that may be encountered when in use.

Referring to Fig. 6, hose assembly 20 (the same assembly as shown in Fig. 5) is connected to an injector assembly 21 in a fully extended position with the hose and second fitting opening 16 B aligned with one another, but with the opening 16B directed away from the second fitting 19B. The total length of the injector and hose assembly is similar to that shown for the injector and hose assembly of Fig. 4.

Referring to Fig. 7, hose assembly 20 is folded in parallel (aligned side by side) with the injector body. The overall length is considerably shorter than that of Figs. 4 and 6. This is very useful for storage of the injector in connection the hose assembly. Typically the injector and hose assembly are stored connected to each other as it is easy to get the liquids on clothin g and other objects when the injector and hose assembly are disconnected. These liquids are often very difficult remove. Clothing can be easily ruined from contact with these liquids.

Referring to Fig. 8, hose assembly 20 has a position at approximately 90 degrees to the injector body. The hose assembly will typically be used substantially in this position for air conditioning systems as it permits connection to an air conditioning port that is pointing upwards, while holding an injector horizontally. This is generally a preferred position.

Although the parallel (side by side) position and the 90 degree position are necessary to avoid twisting having to bend the hose in many applications (something that is not easy when also having to connect the hose assembly to the injector and air conditioning or refrigeration system), other positions are helpful. For example, being able to place put the hose assembly into a position opposite to that shown in Fig. 8, such the second fitting opening is directed at 90 degrees to the hose, but the second fitting opening is at 180 degrees to the position shown in Fig. 8, allows the injector to be flipped, while otherwise maintaining the hose assembly in position. This means that an operator has much more flexibility in choosing the most comfortable or otherwise preferable position for holding the injector while connected to the air conditioning or refrigeration system.

Referring to Figs 9A through 9D, the internal design of the joint is evident. It is not necessary to use this particular design in order to achieve all or any one particular benefit described herein. It will be evident to those skilled in the art that modifications can be made to what has been

described throughout this description while remaining within the spirit and scope of the invention as described by the claims.

Swivel arm 18 is shown shortened in Fig. 9A. The arm 18 can be easily extended as shown in Figs. 5 through 8, for example, by providing an extension 18A in Fig. 5. Arm 18 has a coupling protrusion 91 having a first annular groove 93 followed by a second annular groove 95 of greater diameter. The swivel body 16 has an aperture 97 of similar general contour to, and for receiving, the protrusion 91.

The aperture 97 has an annular groove 99 for receiving an elastic retaining ring, not shown, that is placed in the groove 95 under compression, and permitted to expand into the groove 99, such that the ring extends into both grooves 99 and 95. This serves to lock the swivel arm 18 and swivel body 16 together, while allowing rotational movement. Other means of locking the arm 18 and body 16 could be used, such as a set screw, not shown, through the body 16 into the groove 95. An o-ring, not shown, is placed in the groove 93 for sealing against wall 101 of aperture 97 to prevent leakage between the aperture 97 and protrusion 91.

There is a bore 103 through the swivel body 16 into opening 16. The bore 103 has a narrow portion 105 into which the aperture opens. The narrow portion 102 receives a plunger 107 with a broad head 109 and a narrower body 111. The head 109 and bore 103 have matching contours to provide a seal that blocks access between the bore 103 and the opening 16. An o-ring, not shown, can be provided to seat between the bore 103 and head 109 for a better seal.

The head 109 is normally biased against the bore 103 by a compression spring, not shown, held in place between plug 112 and head 109 about the plunger body 111. The plunger 107 can be pushed away from the bore 103 against the compression spring to provide access between the bore 103 and the opening 16B. In this way the plunger 107/ bore 103 combination acts as a check valve. The check valve is located in close proximity to the opening 16B to minimize spillage when an injector assembly is removed from the opening 16B.

Swivel arm 18 has a mouth 113 with threads 115 for receiving a threaded hose, such as hose 19. A conduit 117 extends from the mouth 113 through the protrusion 91.

When the swivel arm 18 and body 16 are locked together and the check valve is open, liquid access is provided from the opening 16B about the plunger 107 through the bore 103, aperture 97 and conduit 117 to the mouth 113 and a connected hose, such as hose 19. The check valve can be opened by injected liquid from an injector assembly into the opening 16B.

Thus, the joint (swivel arm 18 and body 16) together with a hose 19 and fitting 19B provide a liquid path between, for example, an injector assembly 12 and an air conditioning or refrigeration system connected to fitting 19B.

The swivel arm 18 and body 16 are preferably made from brass; however, other materials, including metals such as aluminum or steel and including plastics, may be used separately or in combination provided the materials are selected for compatibility and strength.

The swivel arm 18 and swivel body 16 provide a non-collapsing joint with multiple positions. In this context non-collapsing means that the path does not collapse to impede or prevent the flow of liquid as a result of moving the joint between positions. A collapsing joint would, for example, be a joint formed from a flexible hose or rigid tube that crimps when sufficiently bent, resulting in restricted or blocked flow.

Referring to Fig. 10, a hose assembly portion for connection to a joint as previously described has a straight R134a female quick disconnect coupler 23, for connection to an R134a air conditioning or refrigeration system. Hose 24 is usually flexible. Threads 25 offers a means of attachment to the swivel arm 18 of Fig. 5.

Referring to Fig. 11 a hose assembly portion similar to that of Fig. 10 has a 90 degree R134a female quick disconnect coupler 26, for connection to an R134a air conditioning or refrigeration system.

In all cases, preferably, swivel device 27 permits rotation of the fitting through 360 degrees but no less than 90 degrees in one direction.

Referring to Fig. 12 a hose assembly portion similar to that of Figs. 10 and 11 with an R12, R22 female coupler 30 is for connection to an R12 or R22 air conditioning or refrigeration system.

The swivel device can have the following embodiments:

1. The ability to rotate at a full 360 degrees but no less then 60 degrees from being parallel to the injector body.
2. The ability to rotate to being parallel with the injector body as in Figure 7.
3. The swivel device may have a ratcheting capability to maintain the hose at any desired position in the rotation.
4. The swivel device may have a friction action capability to maintain the hose at any desired position in the rotation

5. The swivel device may be of a manual type unlock and lock to any chosen position within its rotation capabilities.

6. The swivel arm 18 Figure 5 can be sufficiently long enough to clear the injector body assembly as shown in Figure 7.

7. The swivel assembly can have a check valve 22 Figure 9.

It will be understood by those skilled in the art that this description is made with reference to the preferred embodiment and that it is possible to make other embodiments employing the principles of the invention which fall within its spirit and scope as defined by the following claims.

We claim:

1. An injection hose assembly for connection between a pressurized system and an injector for injecting fluids into the pressurized system, the assembly comprising:

a) a first fitting compatible with a fitting on the pressurized system,

b) a second fitting compatible with the injector, the second fitting having an opening to which the injector can be connected,

c) a substantially non-collapsing joint between the first fitting and the second fitting, and

d) a generally tubular hose between the first fitting and the joint,

wherein the first fitting, hose, joint and second fitting are connected to provide fluid connection between the first fitting and the second fitting, and

wherein the second fitting is offset from the hose and the joint permits at least two positions of the second fitting with respect to the hose, in the first position the second fitting opening is substantially aligned with the hose directed towards the first fitting and in the second position the second fitting opening is directed at 90 degrees to the hose.

2. An injection hose assembly for connection between a pressurized system and an injector for injecting fluids into the pressurized system, the assembly comprising:

a) a first fitting compatible with a fitting on the pressurized system,

b) a second fitting compatible with the injector, the second fitting having an opening to which the injector can be connected,

c) a substantially non-collapsible swivel joint between the first fitting and the second fitting, and

d) a generally tubular hose between the first fitting and the swivel,

wherein the first fitting, hose, swivel and second fitting are connected to provide fluid connection between the first fitting and the second fitting, and

wherein the second fitting is offset from the hose and the joint permits rotation of the second fitting with respect to the hose between a first and a second position, in the first position the second fitting aperature is substantially aligned with the hose directed towards the first fitting and in the second position the second fitting opening is directed at 90 degrees to the hose.

3. The injection hose assembly of claim 1, wherein: the joint has a third position again substantially at 90 degrees to the first position, while the second fitting opening is directed in the opposite direction from the second position.

4. The injection hose assembly of claim 2, wherein: the joint also permits rotation of the second fitting to a third position again substantially at 90 degrees to the first position, while the second fitting opening is directed in the opposite direction from the second position.

5. The injection hose assembly of claim 1 or claim 2, wherein: the second fitting is offset from the hose by a distance sufficient to permit the hose and the injector to pass one another without bending the hose.

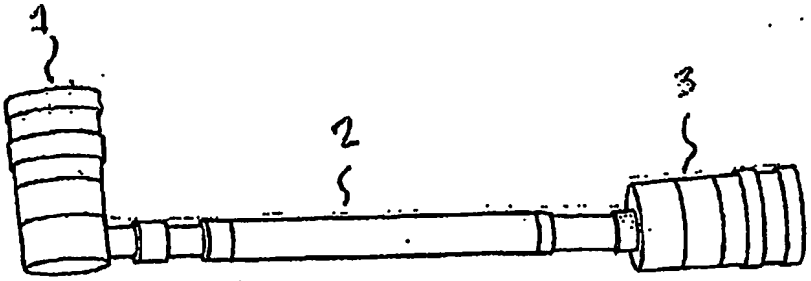


Fig 1

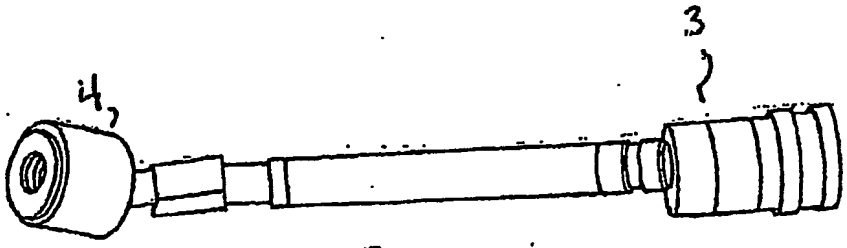


Fig 2

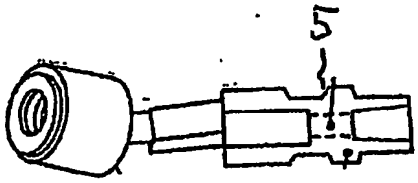


Fig 3

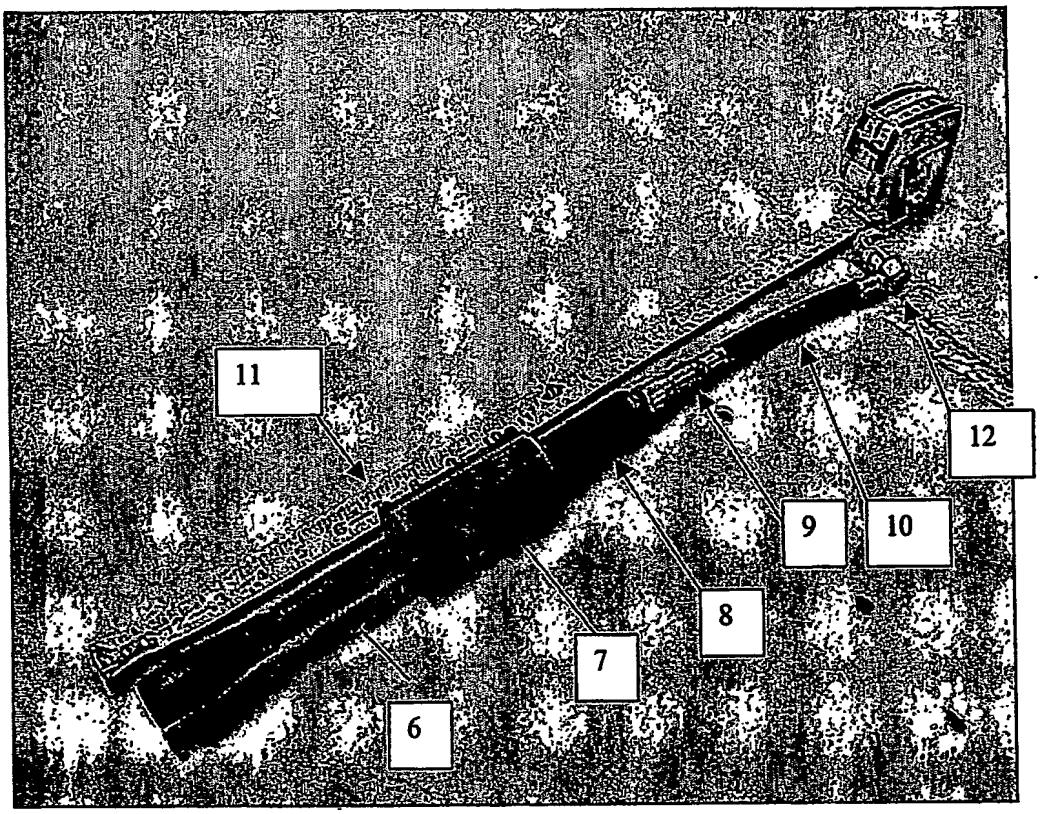


Fig. 4

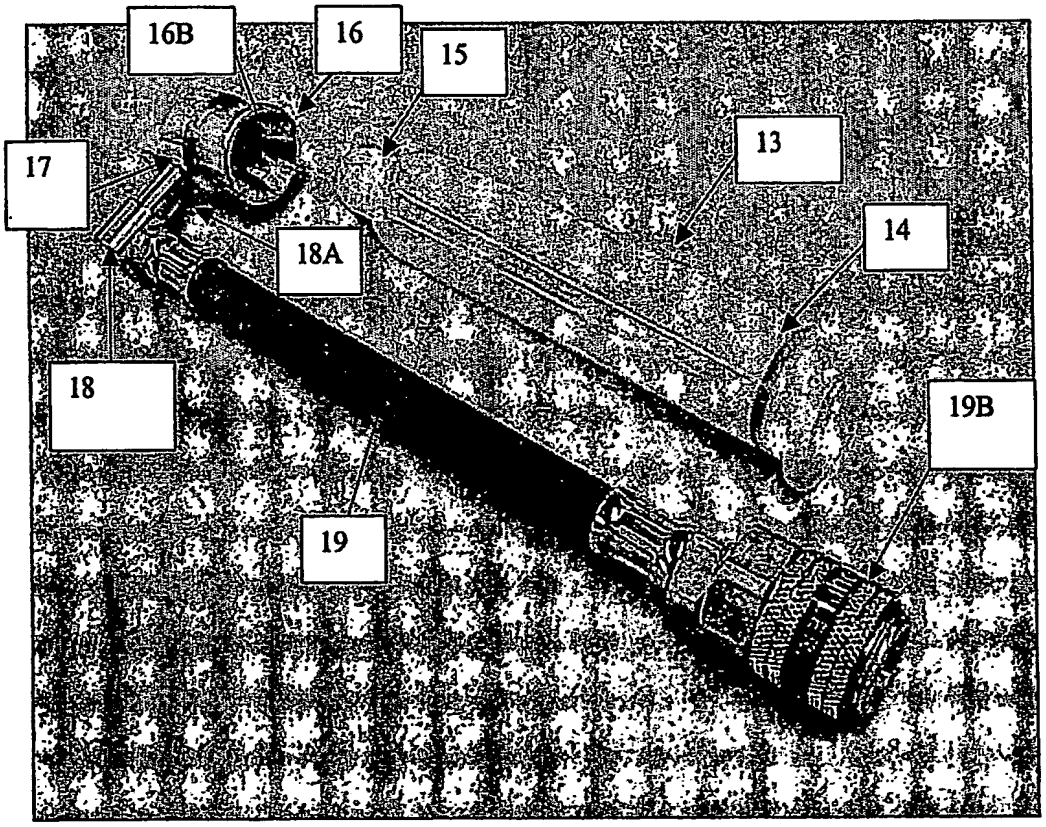


Fig. 5

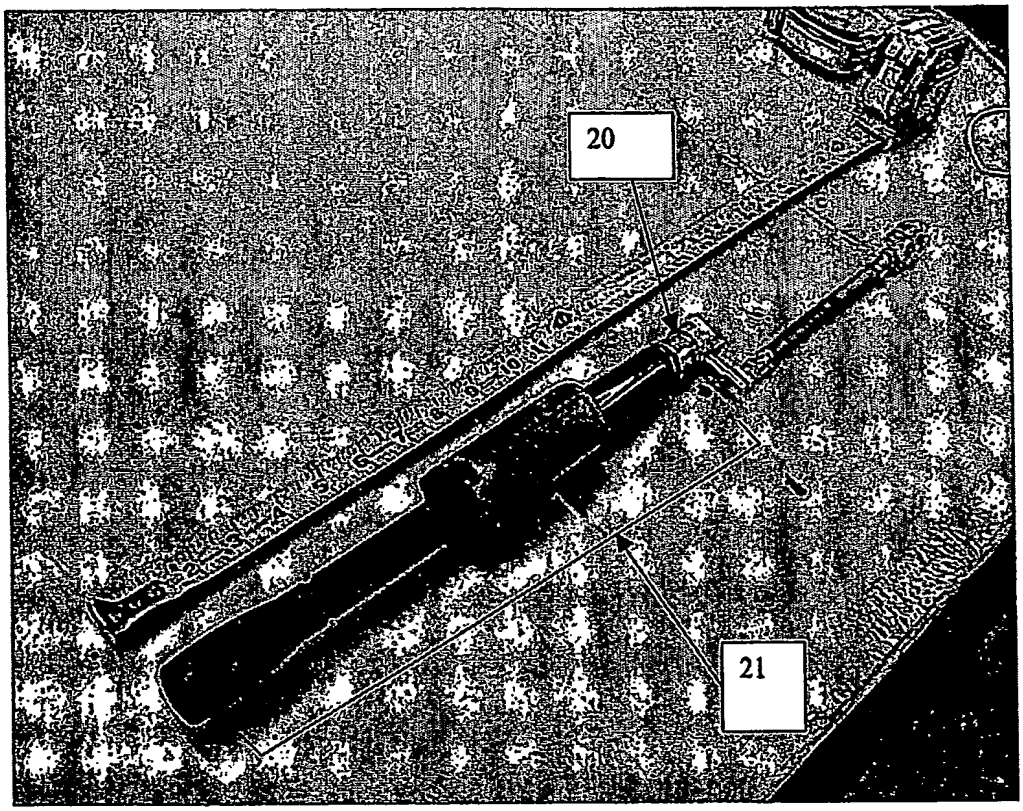


Fig. 6

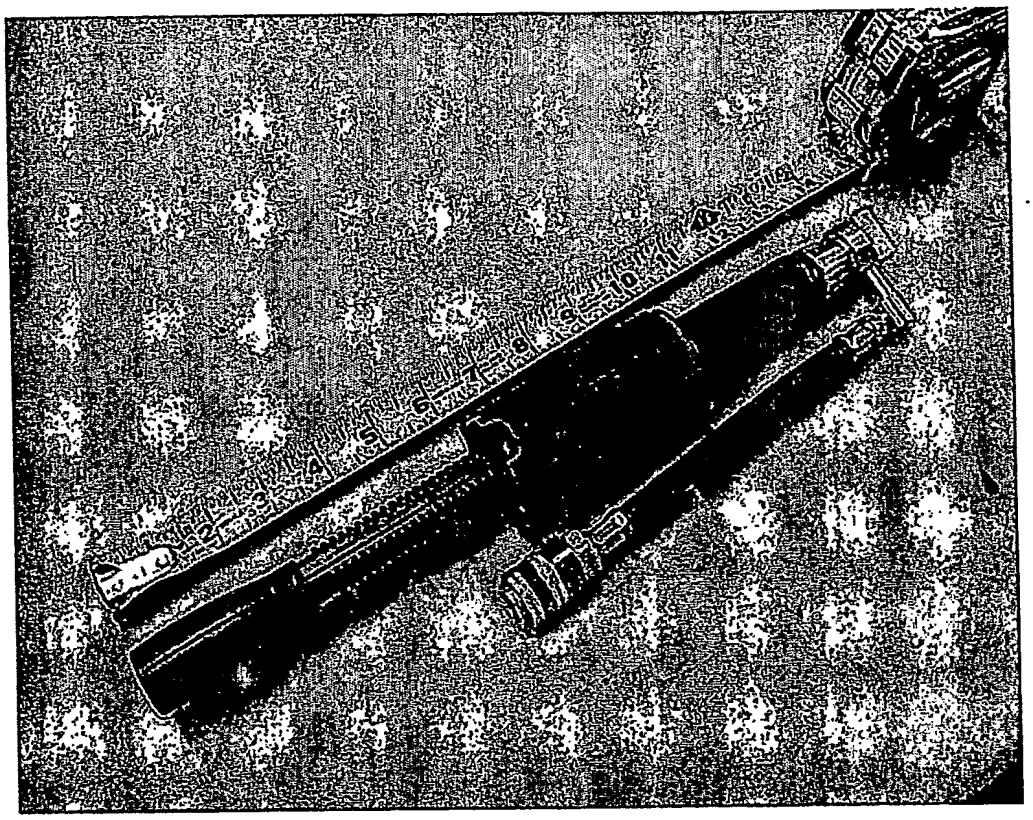


Fig. 7

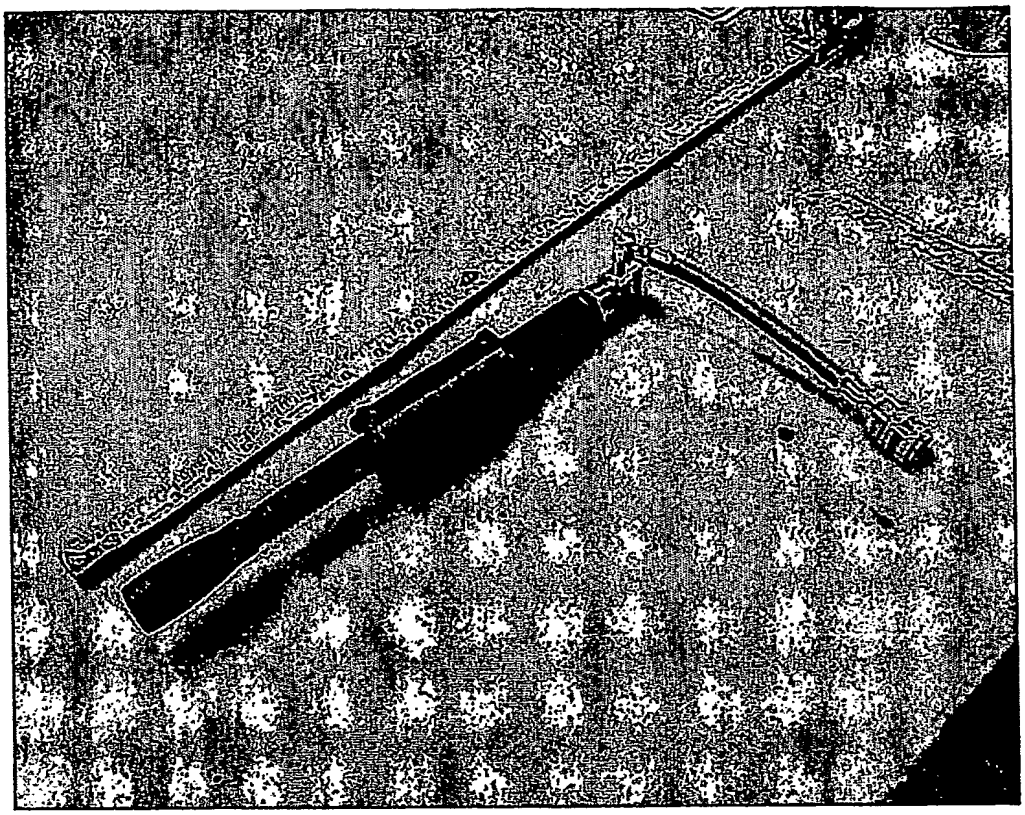
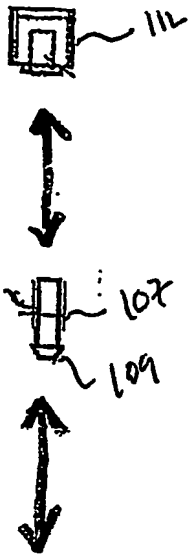


Fig. 8



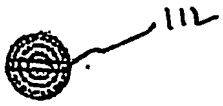


Fig. 9C

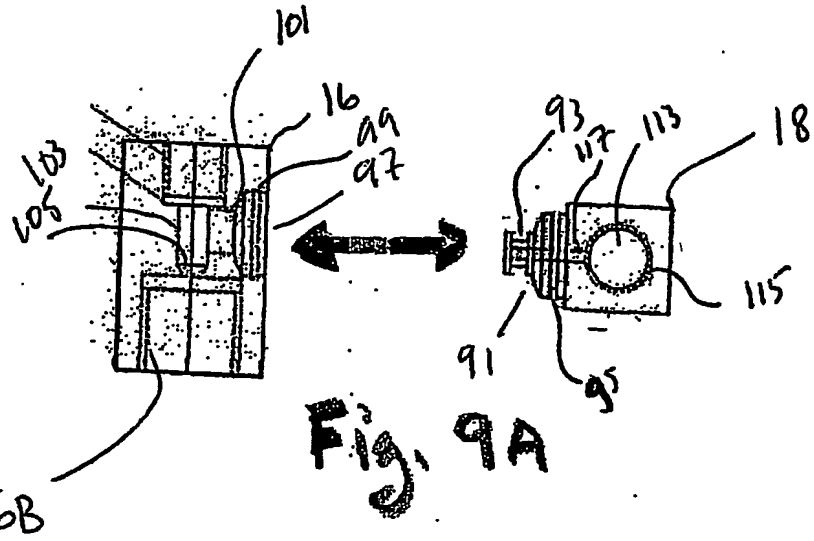


Fig. 9A

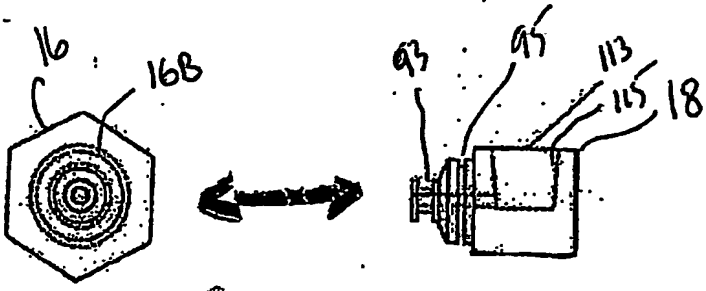


Fig. 9B

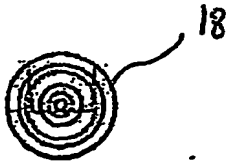


Fig. 9D

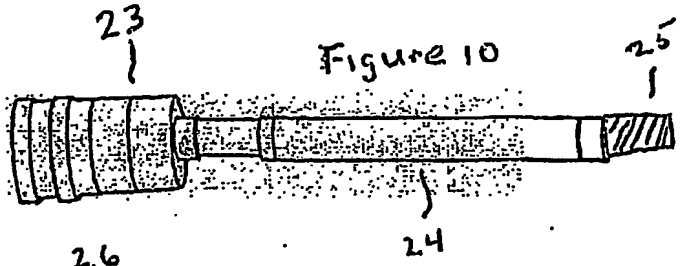


Figure 10

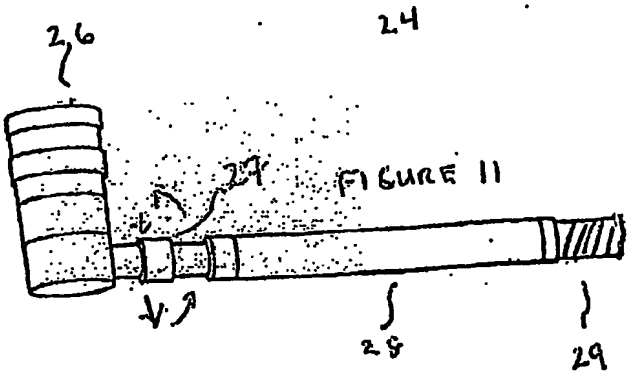


FIGURE 11

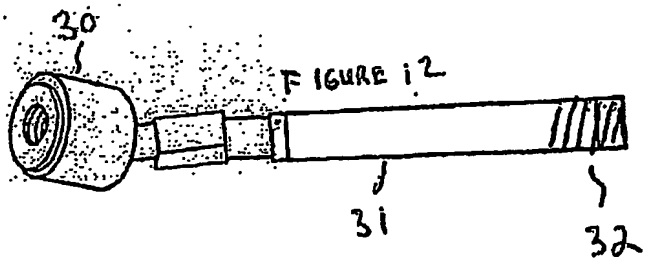


FIGURE 12

Document made available under the Patent Cooperation Treaty (PCT)

International application number: PCT/CA04/001904

International filing date: 01 November 2004 (01.11.2004)

Document type: Certified copy of priority document

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